

SECA is working to create  
  
a solid oxide fuel cell  
  
technology by 2010 that  
  
will offer a low-cost,  
  
high-efficiency system  
  
available at less than  
  
\$400/kW for stationary,  
  
transportation, and  
  
military applications.



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Operated by Battelle for the  
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SOLID STATE ENERGY CONVERSION ALLIANCE





## A Vision for Sustainable, Highly Efficient Energy Production

Fuel cells will play an important role in securing our energy future by providing efficient, environmentally friendly electrical energy while extending the capacity of our fossil fuel supply. However, fuel cells will only come into broad public use when their cost is significantly reduced. And that can't happen until they are available for a wide variety of applications. The Solid State Energy Conversion Alliance's (SECA) goal is to create a solid oxide fuel cell (3-10kW) that can be mass produced in modular form. Used individually or in clusters, depending upon the amount of energy required, these fuel cells will be able to power a broad array of applications. As the number of uses for fuel cells grows, per unit costs can be reduced as high volume production technologies are brought to bear.

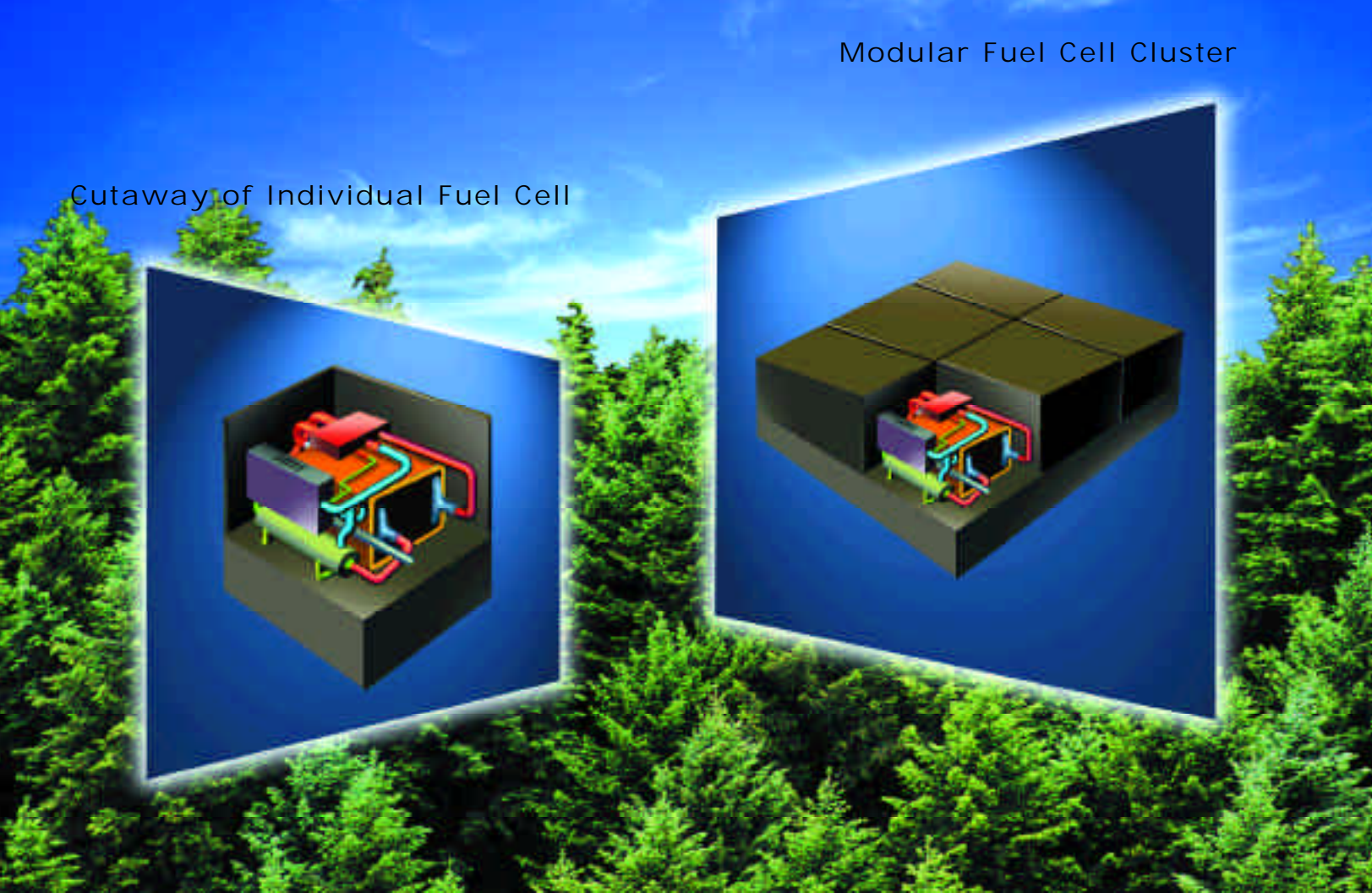
**SECA- A New Model for Energy Development** The Solid State Energy Conversion Alliance is moving to accelerate the commercialization of low-cost solid oxide fuel cells as quickly as possible over the next decade. It is a collaborative effort led by two of the U.S. Department of Energy's national laboratories – the National Energy Technology Laboratory (NETL) and the Pacific Northwest National Laboratory (PNNL)– supported by DOE's Office of Fossil Energy and NETL's Strategic Center for Natural Gas. This alliance of U.S. industry, universities and other research organizations, represents a new model for joint government and private industry technology development.

**The Solid Oxide Fuel Cell** A solid oxide fuel cell is an electrochemical device that converts the chemical energy of a fuel (such as natural gas, coal-derived synthetic gas, reformed gasoline or diesel) into electrical energy without combustion. Absence of the combustion process in fuel cells eliminates the formation of pollutants including NOx, SOx, hydrocarbons and particulates, and significantly improves electrical power generation efficiency.



**Organization** SECA is organized to jump-start competitive, commercial solid oxide fuel cell production while attacking existing barriers to their development. A government-led project management team will coordinate these two major program elements:

- *Industrial Development Teams* – Several teams of industry partners will be selected to participate in a co-funded, collaborative process to develop a solid oxide fuel cell power generation system. The manufacturing capability and packaging needed for different markets will also be developed by these teams for applications in products ranging from land-based power generation systems to automotive auxiliary power units. These teams will also develop technologies, design elements, and materials needed to achieve breakthrough performance. The development process they will follow is competitive and provides incentives for keeping costs low.
- *Core Technology Program* – The Core Technology Program supports the industrial development teams by providing problem-solving research to overcome barriers identified by the industry teams. The Core Technology results will be made available to all industrial teams. Universities, national laboratories and other research-oriented organizations are participating in this program. NETL and PNNL supply the coordination and technical resources. Both national laboratories have decades of experience in forming and managing collaborative research with industry.



## Applications

- *Stationary* – Solid oxide fuel cells will efficiently provide clean, economical electricity either in urban settings, or in remote locations for homes, hospitals, farms, businesses or recreation facilities.
- *Transportation* – Solid oxide fuel cells are able to work with all standard transportation fuels to provide auxiliary power for trucks and other vehicles.
- *Military* – Fuel cells are attractive for military uses because they represent quiet, clean, uninterruptible energy that can be delivered at the point of power application.

## Benefits

Solid oxide fuel cell technology as the basic building block for multiple applications offers several advantages:

- *Efficient* – 40- 60 % efficiency in individual electric systems and up to 80% in hybrid systems
- *Fuel Flexible* – Uses available liquid fuels such as gasoline and diesel as well as natural gas and propane
- *Fuel Extending* – Extends the use of a variety of fossil fuels, including vast domestic coal reserves
- *Distributive Energy* – Brings electricity to remote locations where no transmission exists
- *Environmental* – Reduces global warming and air pollution
- *Domestic Security* – Reduces dependence on foreign oil
- *Future Power Generation* – Enables centralized generation of power to serve significant electric loads

